

HOLOTHURIA (THYMIOSYCIA) THOMASI NEW SPECIES,
A LARGE CARIBBEAN CORAL REEF INHABITING
SEA CUCUMBER (ECHINODERMATA: HOLOTHUROIDEA)

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A B S T R A C T

Holothuria (Thymiosycia) thomasi reaches a length of approximately 2 m and occupies crevices in coral reefs in depths of 3–30 m, where it anchors its posterior end and extends its anterior end outwards to feed on sandy substrates. The ossicles of this highly active species are similar to those of the Indo-Pacific *H. (T.) hilla* lesson, but differences in body size, color, calcareous ring, habitat and behavior readily distinguish the two species. *H. (T.) thomasi* is known from the Florida Keys, Puerto Rico, Virgin Islands, Lesser Antilles, Colombia, Panama and Mexico.

Late in 1977 Dr. Lowell P. Thomas of the University of Miami sent to one of us (D.L.P.) a single specimen of a large holothurian that had been collected from the Florida Keys in 1962. He noted (personal communication) that this species "lives under rocks on coral reefs and is capable of extending itself to amazing lengths while feeding." More recently, I.E.C. sent D.L.P. a brief description of the same species, which he had discovered in Colombia.

This paper represents our joint findings. Additional material and ecological data have been collected at Panama by Dr. Gordon Hendler of the Smithsonian Oceanographic Sorting Center and at Puerto Rico and St. Croix by Mr. Charles Arneson of the University of Puerto Rico.

We were surprised to learn that such a large and apparently widespread species has escaped "discovery" by holothurian systematists until relatively recently. It has undoubtedly been overlooked in the past because it tends to live at depths of 3 m and more, and because in some areas it appears to remain inactive and concealed during daylight hours.

Type-specimens have been deposited in the National Museum of Natural History, Smithsonian Institution (U.S.N.M.).

Holothuria (Thymiosycia) Pearson, 1914

This subgenus was resurrected by Rowe (1969) to accommodate approximately 12 species of *Holothuria* which share well developed tables and smooth buttons, a strong calcareous ring with large radial pieces, a collar of papillae around the tentacles, and irregularly arranged dorsal papillae and ventral pedicels. Two species, *arenicola* Semper and *impatiens* (Forskål) are known from the western Atlantic. Rowe's (1969: 147) reference to *gyrifer* Selenka from the "West Indies" was an inadvertent error (F. W. E. Rowe, personal communication).

Holothuria (Thymiosycia) thomasi new species

Figs. 1, 2

Diagnosis.—Large species, up to 2 m long, yellowish brown to maroon, often mottled. Body wall ossicles tables with up to 12 marginal perforations and buttons with three pairs of elongate perforations; tables and buttons average 69 μ m in diameter or length. Radial pieces of calcareous ring with exceptionally wide anterior notches.



Figure 1. *Holothuria (Thymiosycia) thomasi* n.sp. A, anterior end of feeding specimen, Bahia Granate, Colombia, 12 m, September 13, 1978, 1500 h. The knife is approximately 30 cm long. B, anterior end of feeding specimen. Note circumoral collar in contact with substrate. Bahia Granate, Colombia, 15 m. C, Iván Caycedo with a complete specimen; anterior end is to the right. Note that the dorsal papillae tend to disappear when specimen contracts. Bahia Granate, Colombia, 15 m. D, attempts to dislodge specimens usually result in frustration. Note numerous ventral feet and fewer but larger dorsal papillae. Bahia Santa Marta, Colombia, 20 m. All photographs by Dr. Friedemann Köster.

Material Examined.—Holotype (U.S.N.M. E18081), Alligator Reef, Florida Keys, ½ mile south-south-west of Alligator Reef Light, 7 m, 8 September 1962, collected by Walter A. Starck and H. A. Feddern. Total length (strongly contracted) 15 cm.

Paratype (U.S.N.M. E18082), Korbiski Reef, San Blas Islands, Panama, 3 m, 17 September 1978, collected by G. Hendler. Total length (strongly contracted incomplete specimen) approximately 15 cm.

Etymology.—We name this species, with pleasure, for Dr. Lowell P. Thomas of the Rosenstiel School of Marine and Atmospheric Science, University of Miami,

who was the first to recognize it as a possible new species, and who has contributed much to our knowledge of western Atlantic echinoderms.

Description.—Body elongate, cylindrical, slightly dorsoventrally flattened, highly contractile, total length in expanded condition up to 2 m. Dorsal surface with scattered bluntly pointed papillae. Ventral feet cylindrical, more numerous than dorsal (Fig. 1). Terminal collar of conspicuous papillae surrounds ring of tentacles. Mouth ventrally directed, surrounded by ring of 20 peltate tentacles. Color highly variable, yellowish brown to maroon, often mottled. Ventral surface lighter than dorsal. Ventral feet brown to yellowish brown. Tentacles 20, peltate, light yellow to light pink or chocolate brown; stems darker than fronds.

Calcareous ring strong, with large radial pieces (Fig. 2H). Anterior notch of radial very broad, for insertion of exceptionally well developed radial longitudinal muscles. Madreporite resembling a small bunch of grapes, 4 mm in diameter. Two Polian vesicles, both extremely long (70 mm) narrow sacs. Cuvierian organs present. Respiratory trees well developed. Gonad a bunch of unbranched caeca, those of holotype containing eggs $117\text{ }\mu\text{m}$ in diameter.

Ossicles in dorsal and ventral body wall tables (Fig. 2A) and buttons (Fig. 2B). Tables variable in shape, averaging $69\text{ }\mu\text{m}$ in width and $43\text{ }\mu\text{m}$ in height. Disc with more or less complete ring of approximately 12 holes, usually four larger holes and eight smaller, but in many cases disc carries as few as three or four holes. Spire short, with four pillars, surmounted by short, blunt projections. Buttons more numerous than tables (4:1), elongate, typically with three pairs of elongate perforations. Average length of buttons $69\text{ }\mu\text{m}$, range 58–80 μm .

Dorsal and ventral feet with endplates, buttons and tables, and a few perforated plate-like ossicles (Fig 2D), often rudimentary. Tentacles with spinous rods (Fig. 2E) varying considerably in size, from 40 to 470 μm .

Habitat and behavior.—*H. (T.) thomasi* has been found only in association with coral reefs, where it occupies crevices, with the posterior one- to two-thirds of its body wrapped around hermatypic corals such as *Montastrea cavernosa* and *Diploria strigosa*. It is almost impossible to dislodge a specimen by hand. When disturbed, specimens contract strongly and rapidly, but they usually refrain from ejecting their cuvierian organs. When feeding, the anterior end of the body extends outwards, away from the reef, and the animal appears to "vacuum" material from the sand to rubble substrate. Intestine contents of the holotype and paratype are exclusively biogenic calcareous medium to coarse sand to rubble, including pieces of calcareous rubble up to 20 mm long. There is no evidence of selective detrital feeding; the holothurian is probably subsisting on a bacterial-algal film on the pieces of rubble. Fecal pellets are cylindrical, twice as long as wide.

At St. Croix, Virgin Islands, Charles Arneson observed a single specimen during 4 nights and 8 days, and found that feeding took place at dusk and during the night; during daylight hours, the specimen was contracted and inactive. Gordon Hendler observed a similar behavior pattern in specimens at the San Blas Islands, Panama. In contrast, I.E.C. and colleagues, diving only during daylight hours, found that this species was actively feeding between the hours of 1100 and 1700 at six different localities in Colombia and in depths ranging from 8 to 22 m. It is not yet known whether the Colombian populations are active at night.

Specimens do not react to a strong light at night, according to Charles Arneson. In response to sudden changes in current velocity and direction, the anterior end of the animal waves passively in the water, and then settles down again when the temporary disturbance is over. Some specimens are sedentary, remaining in one

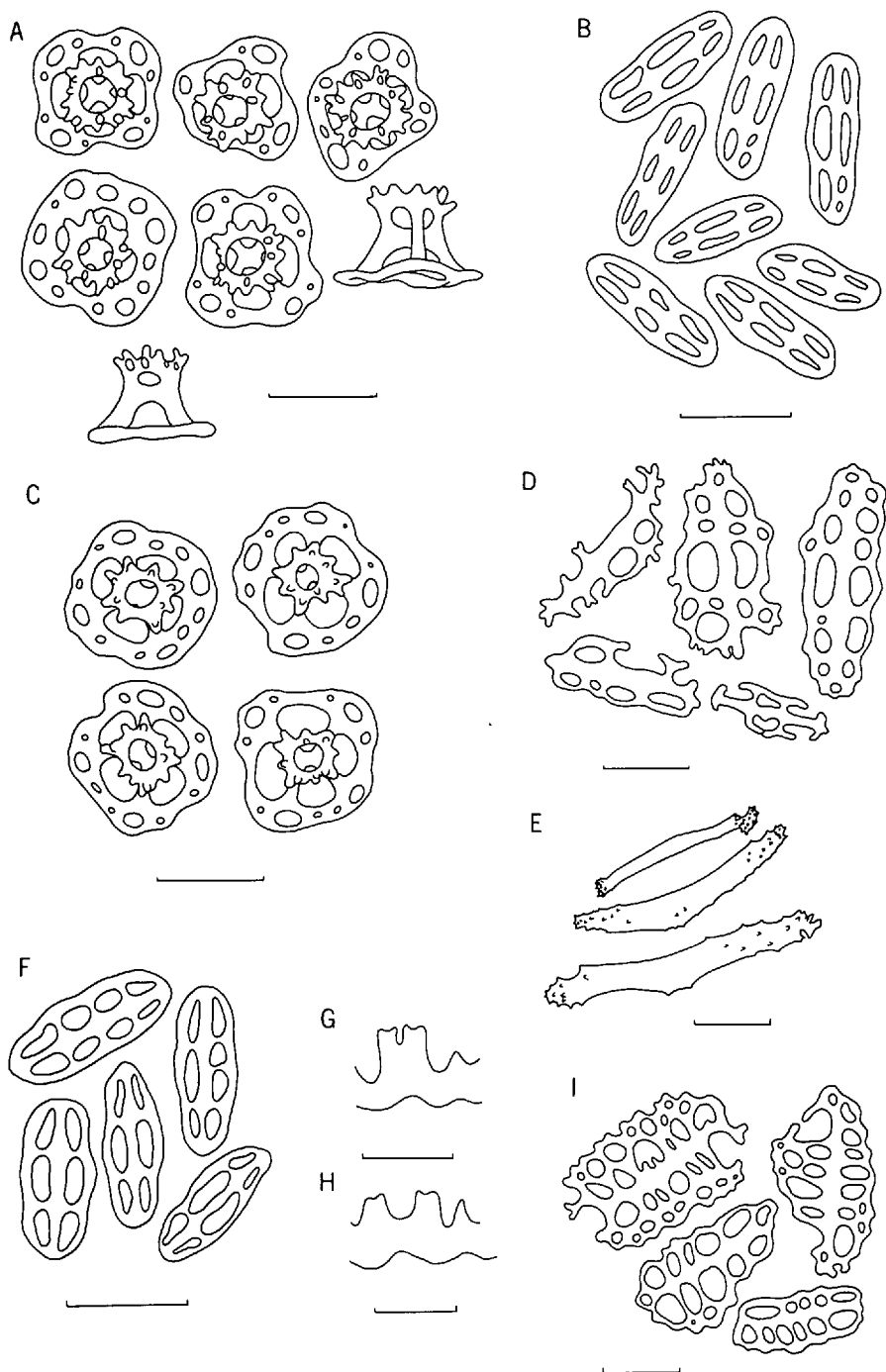


Figure 2. A, B, D, E, H. *Holothuria (Thymiosycia) thomasi* n.sp. A, tables from dorsal body wall; B, buttons from dorsal body wall; D, plate-like ossicles from dorsal papillae; E, rods from tentacles; H, radial and interradial pieces of calcareous ring. C, F, G, I. *Holothuria (Thymiosycia) hilla* Lesson. C, tables from dorsal body wall; F, buttons from dorsal body wall; G, radial and interradial pieces of calcareous ring; I, plate-like ossicles from dorsal papillae. Scales: Fig. 2A–F, I, scale = 50 μ m; Fig. 2G, scale = 3 mm; Fig. 2H, scale = 10 mm.

spot for weeks at a time; others move within restricted areas. Between 1530 hours on 23 October 1978 and 1100 hours on the next day, a single Colombian specimen changed its location, and in doing so moved a total distance of 1.55 m.

Distribution and bathymetric range.—Alligator Reef, Florida Keys, 7 m, W. Starck and H. Feddern; Salt River Canyon, St. Croix, Virgin Islands, 10–30 m, C. Arneson; Cabo Rojo, Puerto Rico, 10–30 m, C. Arneson; Korbiski Reef, San Blas Islands, Panama, 3 m, G. Hendler; Young Island Channel, St. Vincent, Lesser Antilles, 12 m, L. Corredor; Isla Cozumel, Quintana Roo, Mexico, 8–10 m, J. Cole; from Rosario Island to Nenguangue Bay, Colombia, 8–28 m, I. Caycedo.

This species is widely distributed in the Gulf of Mexico and Caribbean in suitable habitats. Because of its often secretive habits, it usually escapes the attention of the casual collector.

Remarks.—Within the subgenus *Thymiosycia* this new species seems to have affinities with the subgroup described by Rowe (1969:147) as having “. . . tables having the disc round or irregular in outline, usually perforated with >8 peripheral holes, the buttons have three to ten pairs of comparatively large holes” This subgroup comprises the species *gyrifer* Selenka, *hartmayeri* Erwe, *hilla* Lesson, *macroperona* Clark, *strigosa* Selenka and *zihuatanensis* Caso. *Holothuria* (T.) *thomasi* can be distinguished from the above species as follows:

In *H. (T.) hartmayeri*, the tables have fewer perforations (usually eight), which are almost all of the same size. *H. (T.) macroperona* has buttons with three to six pairs of perforations. *H. (T.) strigosa* has buttons similar to those of *thomasi*, but the discs of the tables have marginal projections. *Holothuria* (T.) *zihuatanensis* has irregularly shaped buttons with more than three pairs of perforations.

Holothuria (T.) *hilla* and *H. (T.) gyrifer* and now regarded as synonymous (F. W. E. Rowe, personal communication; also, see Clark and Rowe, 1967), and *H. (T.) hilla* is the older name. This species is distributed across the Indo-Pacific, from Pacific Panama to East Africa. It is yellowish-brown with pale areas around the dorsal papillae. The color is usually lighter ventrally. There are few papillae dorsally and numerous tube feet ventrally. Length seldom exceeds 20 cm. *Holothuria* (T.) *hilla* typically lives concealed under rocks, among coral rubble, or in sand in shallow water (Deichmann, 1958; Rowe and Doty, 1977). The ossicles of *H. (T.) hilla* and *H. (T.) thomasi* are virtually identical, although the tables and buttons of the former species (Figs. 2C, 2F) are slightly smaller (60 μ m) than those of the latter (69 μ m). Ossicles in tentacles and tube feet are similar also, except that in *H. (T.) hilla* there are more numerous plate-like ossicles (Fig. 2I) in the tube feet. The calcareous rings are strikingly different. Radial pieces in *H. (T.) thomasi* have very wide anterior notches, while those in *H. (T.) hilla* have narrow notches (Fig. 2G). Other differences, in size, color and living habits serve to distinguish the two species.

It is remarkable that such strikingly different holothurians should have virtually identical ossicles. We are persuaded that the two species are distinct, not only because of the differences discussed above, but also because of the fact that no large specimens of *H. (T.) hilla* have yet been found in the Indo-Pacific, and nor have any small specimens of *H. (T.) thomasi* been found in the Caribbean. If the species were identical, it is easy to understand how large specimens in the Indo-Pacific may have been overlooked, but the absence of small specimens from shallow water habitats in the Caribbean is notable. It seems likely that small specimens of *H. (T.) thomasi* occur in deeper water, probably concealed in crevices; certainly a different way of life from that of *H. (T.) hilla*.

It might be suggested that *H. (T.) thomasi* is the Caribbean counterpart of *H. (T.) hilla*, the latter species being known from several localities in Pacific Colombia and Panama. The differences between these species are so striking, however, that it is difficult to conceive of them diverging to such a degree during the relatively short period of time that the Isthmus of Panama has been above sea level. The evidence of fossil and living echinoderms indicates that the holothurians are a rather conservative group.

From its two other western Atlantic consubgenera, *H. (T.) thomasi* is easily distinguished. *Holothuria (T.) arenicola* is a burrowing form with reduced discs on the tables. *Holothuria (T.) impatiens* lives concealed among rocks or in sand and has large (80–100 μm) tables with a maximum of eight perforations in the disc.

ACKNOWLEDGMENTS

We are especially grateful to Dr. L. P. Thomas for calling our attention to this interesting new species, to Dr. G. Hendler for collecting specimens from the San Blas Islands, Panama, and to Mr. C. Arneson, for his observations and photographs of specimens from Puerto Rico and St. Croix, Virgin Islands. The staff of INVEMAR, Santa Marta, Colombia generously provided help and equipment. Dr. F. Köster kindly assisted in field observations and offered photographs and valuable suggestions. The work of I.E.C. was supported by a grant from Deutscher Akademischer Austauschdienst (D.A.A.D.).

I regret to report the recent (December 9, 1978) death of my colleague and friend Iván Enrique Caycedo. Iván and three colleagues were criminally injured while using SCUBA to make further observations on Colombian holothurians. I am most grateful to Dr. F. Köster, one of the survivors, for his help in many matters. D.L.P.

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DATE ACCEPTED: November 6, 1979.

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